PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference AP/P653	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/LV 03/00002	International filing date *(day/month/year)* 21.03.2003	Priority date *(day/month/year)* 22.03.2002
International Patent Classification (IPC) or both national classification and IPC H03M7/30		
Applicant DATORU DROSIBAS TEHNOLOGIJAS, SIA ET AL.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
17.09.2003	17.09.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Barel-Faucheux, C Telephone No. +49 89 2399-4457

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/LV 03/00002

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-13 as originally filed

Claims, Numbers

1-16 received on 21.05.2004 with letter of 19.05.2004

Drawings, Sheets

1/7-7/7 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

   see separate sheet

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-16
	No:	Claims	
Inventive step (IS)	Yes:	Claims	2-6 10-14
	No:	Claims	1 7-9 15 16
Industrial applicability (IA)	Yes:	Claims	1-16
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:
D2: US-A-5 229 768 (THOMAS KASMAN E) 20 July 1993 (1993-07-20)

1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1, 7-9 ,15 and 16, does not involve an inventive step in the sense of Article 33(3) PCT.

1.1. The document **D2** is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document)

a method for coding an input data character stream to obtain a compressed output code stream, said method comprising the steps of (column 3, line 15-68; column 4, line 31, to column 5, line 34; column 6, line 9-34; column 6, line 55, to column 11, line 68):

a) ~~counting consecutively predicted characters by~~ comparing a character of the input data character stream with a predictor stored in a predictor table and addressed by a hash string, said predictor table comprising a plurality of predictors, said predictors being the characters of the input data stream and/or predetermined values, and said hash strings being formed by means of a hash function correlative with the input data ;

b) coding a number of consecutively predicted characters and an unpredicted character immediately succeeding the consecutively predicted characters;

c) optional updating the predictor table by storing the unpredicted character into a cell of the predictor table, said cell being addressed by said hash string;

d) updating the hash string.

The subject-matter of claim 1 therefore differs from this known **D2** in that in claim 1 the consecutively predicted characters are counted and the value of the counter is encoded (for example by Elias Delta coding) and outputted when an unpredicted character occurs together with this unpredicted character, whereas in **D2**, booleans true are successively outputted as a result of each successful character prediction, and booleans false are outputted when an unpredicted character occurs together with this

unpredicted character.

The problem to be solved is to code a number of successively predicted characters.

The feature of counting the successively predicted characters and outputting a coded value of the counter is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

1.2. The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent apparatus claim 9 which therefore is also considered not inventive.

1.3. Claim 8 defines a method of decompression for obtaining an initial input data character stream from the compressed code stream obtained by the compression method according to any of claims 1 to 7, the decompression method comprising the steps of:
- decoding a number of consecutively predicted characters and an unpredicted character immediately succeeding the consecutively predicted characters;
- outputting the predicted characters by retrieving a predictor stored in a predictor table and addressed by a hash string, the retrieving being continued until the initial values assigned to the counter in the compression process is reached;
- outputting the unpredicted character;
- optionally updating the predictor table by storing the unpredicted character into a cell of the predictor table, the cell being addressed by the hash string, and
- updating the hash string.

This is a decompression method which is straightforwardly derived from the compression method of claim 1 and thus is also not inventive.

1.4. Point 1.3. above applies mutatis mutandis to independent claim 16 for the decompression apparatus claim.

1.5. The additional feature of dependent method claim 7 with respect to claim 1 is that the method further comprises the step of initiating the hash string at the beginning of the process by assigning a predetermined value to the hash string. This is also known from **D2** (column 7, lines 11-14).
Therefore, claim 7 is not inventive either.

1.6. Point 1.5. applies mutatis mutandis to dependent claim 15 for the apparatus claim.

2. The combination of the features of dependent claim 2 with claim 1 is neither known from, nor rendered obvious by, the available prior art. The reasons are as follows:

2.1. The additional feature of claim 2 with respect to claim 1 to which it refers is that the method of claim 2 further comprises the step of

i) comparing said unpredicted character with a predictor stored in the next predictor table;
ii) coding the number of the consecutively predicted characters and an identifier of said next predictor table, if said unpredicted character matches the predictor stored in said next predictor table; or
iii) coding the number of the consecutively predicted characters and the unpredicted character immediately succeeding the consecutively predicted characters, if said unpredicted character does not match the predictor stored in said next predictor table.

2.2. The problem to be solved by the present invention may therefore be regarded as providing better suitability for different types of the data to be compressed (see application, on page 8, lines 12-20, and page 13, lines 1-11).

2.3. The solution proposed in claim 2 of the present application can be considered as involving an inventive step (Article 33(3) PCT) for the following reasons : by using several predictor tables, several different hash functions can be used, the predictor tables can be classified according to the frequency of occurrence of their predictors, providing thus higher adaptability to the different types of data to be compressed.

2.4. Claims 3 to 6 are dependent on claim 2 which is inventive, so there are also inventive.

3. For the same reasons as given on point 2, the apparatus of dependent claim 10 with claim 9 is neither known from, nor rendered obvious by, the available prior art.

Claims 11 to 14 are dependent on claim 10 which is inventive, so there are also inventive.

Claims

1. A method for coding an input data character stream to obtain a compressed output code stream, said method comprising the steps of:

   a) counting consecutively predicted characters by comparing a character of the input data character stream with a predictor stored in a predictor table and addressed by a hash string, said predictor table comprising a plurality of predictors, said predictors being the characters of the input data stream and/or predetermined values, and said hash strings being formed by means of a hash function correlative with the input data;
   b) coding a number of the consecutively predicted characters and an unpredicted character immediately succeeding the consecutively predicted characters;
   c) optional updating the predictor table by storing the unpredicted character into a cell of the predictor table, said cell being addressed by said hash string;
   d) updating the hash string.

2. The method according to claim 1, wherein the step (b) further comprises the steps of:

   i) comparing said unpredicted character with a predictor stored in the next predictor table;
   ii) coding the number of the consecutively predicted characters and an identifier of said next predictor table, if said unpredicted character matches the predictor stored in said next predictor table; or
   iii) coding the number of the consecutively predicted characters and the unpredicted character immediately succeeding the consecutively predicted characters, if said unpredicted character does not match the predictor stored in said next predictor table.

3. The method according to claim 2, wherein, in case said unpredicted character does not match said predictor stored in said next predictor table, the steps (i) to (iii) are performed in a recursive way, until all the existing predictor tables are used.

4. The method according to claim 2 or 3, wherein two or more hash strings are used for addressing the predictors in various predictor tables, each hash string being formed by means of an unique hash function correlative with the input data.

5. The method according to claim 2 or 3, further including an optional step of updating the predictor tables in accordance with a predetermined strategy.

6. The method according to claim 2 or 3, wherein the character of input data stream is compared in parallel with the predictors stored in two or more existing predictor tables.

7. The method according to claim 1, further comprising the step of initiating said hash string at the beginning of the process, in which a predetermined value is assigned to said hash string.

8. A method of decompression a compressed code stream obtained by the compression method according to any of claims 1 to 7, wherein said method of decompression, in order to obtain the original data stream, comprises the steps adequate to the steps of said compression method and comprises adequate data structures.

9. Apparatus for coding an input data character stream in order to obtain a compressed output code stream, which apparatus comprising means adapted for:

a) counting consecutively predicted characters by comparing a character of the input data character stream with a predictor stored in a predictor table and addressed by a hash string, said predictor table comprising a plurality of predictors, said predictors being the characters of the input data stream and/or predetermined values, and said hash strings being formed by means of a hash function correlative with the input data;
b) coding a number of the consecutively predicted characters and an unpredicted character immediately succeeding the consecutively predicted characters;
c) optional updating the predictor table by storing the unpredicted character into a cell of the predictor table, said cell being addressed by said hash string;
d) updating the hash string.

10. The apparatus according to claim 9, wherein said means adapted for (b) further comprises means adapted for:

    i) comparing said unpredicted character with a predictor stored in the next predictor table;
    ii) coding the number of the consecutively predicted characters and an identifier of said next predictor table, if said unpredicted character matches the predictor stored in said next predictor table; or
    iii) coding the number of the consecutively predicted characters and the unpredicted character immediately succeeding the consecutively predicted characters, if said unpredicted character does not match the predictor stored in said next predictor table.

11. The apparatus according to claim 10, wherein said means are adapted so that, in the case said unpredicted character does not match said predictor stored in said next predictor table, the means adapted for (i) to (iii) can be applied in a recursive way, until all existing predictor tables are used.

12. The apparatus according to claim 10 or 11, wherein said means are adapted so that two or more hash strings can be used for addressing the predictors in various predictor tables, each hash string being formed by means of an unique hash function correlative with the input data.

13. The apparatus according to claim 10 or 11, optionally comprising means for updating the predictor tables in accordance with a predetermined strategy.

14. The apparatus according to claim 10 or 11, further comprising means for parallel comparing the character of input data stream with the predictors stored in two or more existing predictor tables.

15. The apparatus according to claim 9, further comprising means adapted for initiating said hash string at the beginning of the process by assigning a predetermined value to said hash string.

16. Decompression apparatus for decompression a compressed code stream obtained with apparatus comprising compression means according to any of claims 9 to 15, wherein said decompression apparatus, in order to obtain the original data stream, comprises means adequate to said compression means.